

Amendment under 37 CFR 1.111
Reply to Office Action dated September 23, 2004
December 23, 2004

AMENDMENTS TO THE CLAIMS

Please substitute the following claims for the pending claims with the same numbers respectively:

Claim 1 (Currently amended): A semiconductor device comprising:

a semiconductor element;

a support member having a recess including a sealing member therein for housing the semiconductor element, the support member including lead electrodes and a support part holding the lead electrodes so that a surface of each of the lead electrodes is exposed in a bottom of the recess; and

wherein the support member has ~~at least~~ a first surface disposed ~~adjacent to~~ outside of the recess and , a second surface disposed ~~adjacent to~~ outside of and being offset from the first surface and a third surface disposed between the first surface and the second surface, the third surface having a portion including a notch.

Claim 2 (Currently amended): A semiconductor device

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comprising:

a semiconductor element;

a support member having a recess for housing the semiconductor element, the support member including lead electrodes and a support part holding the lead electrodes so that a surface of each of the lead electrodes is exposed in a bottom of the recess;

wherein the support member has at least a first surface disposed ~~adjacent to~~ outside of the recess having a sealing member therein and a second surface disposed ~~adjacent to~~ outside of and offset from the first surface, the second surface having at least one of a protrusion and a further recess disposed thereon.

Claim 3 (Original): The semiconductor device according to claim 2, wherein the further recess is a depression and the protrusion forms an outer wall of the depression.

Claim 4 (Original): A semiconductor device comprising:

a semiconductor element;

a support member having a recess for housing the

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semiconductor element, the support member including lead electrodes and a support part holding the lead electrodes so that a surface of each of the lead electrodes is exposed in a bottom of the recess;

wherein the support member has at least a first surface disposed adjacent to the recess and a second surface disposed adjacent to and offset from the first surface of the support member; and

wherein the semiconductor element comprises a semiconductor having a laminated structure with at least a N-type contact layer of a nitride semiconductor having an N-side electrode and a P-type contact layer of the nitride semiconductor having a P-side electrode, the N-type contact layer comprises a first region including a semiconductor laminated structure having a P-side electrode, and a second region including a plurality of protrusions, when viewed from an electrode forming face side; and wherein a top portion of the protrusions is closer to a level of the P-type contact layer than a level of an active layer as viewed along a cross sectional view of the semiconductor element.

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Claim 5 (Original): The semiconductor device according to claim 4, wherein the second surface has a surface protrusion and a further recess disposed thereon, the further recess is a depression and the surface protrusion forms an outer wall of the depression.

Claim 6 (Currently amended): An optical device comprising:
a semiconductor device including

a semiconductor element;

a support member having a recess for housing the semiconductor element, the support member including lead electrodes and a support part holding the lead electrodes so that a surface of each of the lead electrodes is exposed in a bottom of the recess, the support member ~~has~~ further having at least a first surface disposed ~~adjacent to~~ outside of the recess and a second surface disposed ~~adjacent to~~ outside of and offset from the first surface;
and

a sealing member disposed in the recess, said sealing member having an emission surface below said first surface;
and

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a translucent member for allowing light to exit from the semiconductor device, or for allowing light to be received by the semiconductor device, the translucent member having a light entrance portion and a light emitting portion.

Claim 7 (Currently amended): An optical device comprising:
a semiconductor device including

a semiconductor element;

a support member having a recess for housing the semiconductor element, the support member including lead electrodes and a support part holding the lead electrodes so that a surface of each of the lead electrodes is exposed in a bottom of the recess, the support member further having at least a first surface disposed ~~adjacent to~~ outside of the recess and a second surface disposed ~~adjacent to~~ outside of and offset from the first surface, the second surface having at least one of a protrusion and a further recess disposed thereon; and

a sealing member disposed in the recess, said sealing member having an emission surface below the first surface;
and

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a translucent member for allowing light to exit from the semiconductor device, or for allowing light to be received by the semiconductor device, the translucent member having a light entrance portion and a light emitting portion.

Claim 8 (Currently amended): The ~~semiconductor~~ optical device according to claim 7, wherein the further recess is a depression and the protrusion forms an outer wall of the depression.

Claim 9 (Withdrawn): An optical device comprising:
a semiconductor element comprises at least one of:
a fluorescent material containing Al and at least one element selected from Y, Lu, Sc, La, Gd, Tb, Eu, Ga, In, and Sm; and activated with at least one element selected from the rare earth elements, and

a fluorescent material containing N, at least one element selected from Be, Mg, Ca, Sr, Ba, and Zn; and at least one element selected from C, Si, Ge, Sn, Ti, Zr, and Hf; and activated with at least one element selected from the rare earth elements.

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Claim 10 (Currently amended): A semiconductor device comprising:

a semiconductor element;

a support member having a recess for housing the semiconductor element, the support member including lead electrodes operatively connected by a conductive member to the semiconductor element, wherein the support member has at least a first surface disposed ~~adjacent to~~ outside of the recess and a second surface disposed ~~adjacent to~~ outside of and offset from the first surface; and

a sub-mount substrate disposed in the recess ~~and~~ , wherein the semiconductor element being disposed on the sub-mount substrate and a conductive paste material is disposed between a conductive pattern formed on the sub-mount and the lead electrodes.

Claim 11 (Withdrawn): A method of making a semiconductor device comprising the steps of:

providing a molding die;

placing at least two lead electrode portions in the molding

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die;

supplying a molding member to the molding die so that the molding member contacts the portion of at least two lead electrode portions;

heating the molding member in the molding die so as to cure the molding member into a package with the portion of at least two lead electrode portions; and

removing the package from the molding die by a pushing member such that at least one of a protrusion and a recess are formed in a surface of the package.

Claim 12 (Withdrawn): A method of making a semiconductor device as defined in claim 11, further comprising the step of:

forming a lead frame having a plurality of lead electrode portions prior to said step of placing at least two lead electrode portions in a molding die.

Claim 13 (Withdrawn): A method of making a semiconductor device as defined in claim 11, wherein the step of providing a molding die includes providing a molding die having at least two offset surfaces so that a first main surface and a second main

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surface are formed in the package during said step of heating, and wherein said step of removing the package from the molding die by a pushing member forms the at least one of a protrusion and a recess in the second main surface of the package.

Claim 14 (Currently amended): A semiconductor device comprising:

a semiconductor element;

a support member having a recess for housing the semiconductor element, the support member including lead electrodes and a support part holding the lead electrodes so that a surface of each of the lead electrodes is exposed in a bottom of the recess; and

wherein the support member has at least a first surface disposed ~~adjacent to~~ outside of the recess having a sealing member therein, the first surface having at least one of a protrusion and a further recess disposed thereon.

Claim 15 (Original): A semiconductor device set forth in claim 14, wherein said first surface includes the protrusion disposed on an end.

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Claim 16 (Currently amended): A semiconductor device set forth in claim 14, wherein said first surface includes the further recess having a circular ~~cross-section~~ inner wall.

Claim 17 (Currently amended): A semiconductor device set forth in claim 14, wherein said first surface includes the protrusion having a circular ~~cross-section~~ outer wall.

Claim 18 (Original): A semiconductor device set forth in claim 14, further comprising a second surface adjacent to the first surface and said second surface being angularly offset from the first surface.

Claim 19 (Original): A semiconductor device set forth in claim 14, wherein said first surface includes the further recess angularly extending between opposed surfaces of the semiconductor device.

Please add new claims 20-38 as follows:

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Claim 20 (New): The semiconductor device according to claim 2, wherein the sealing member has an emission surface having a substantially elliptical shape.

Claim 21 (New): The semiconductor device according to claim 20, wherein the emission surface has a depression that is an approximately symmetrical parabola with respect to the light emitting element when viewed along the vertical axis extending from the top surface to the bottom of the recess.

Claim 22 (New): The semiconductor device according to claim 2, wherein the sealing member further comprises at least one of:
a fluorescent material containing Al and at least one element selected from Y, Lu, Sc, La, Gd, Tb, Eu, Ga, In, and Sm; and activated with at least one element selected from the rare earth elements, and

a fluorescent material containing N, at least one element selected from Be, Mg, Ca, Sr, Ba, and Zn; and at least one element selected from C, Si, Ge, Sn, Ti, Zr, and Hf; and activated with at least one element selected from the rare earth elements.

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Claim 23 (New): The semiconductor according to claim 2, wherein the sealing member comprises a first layer including a diffusion agent and a second layer including another diffusion agent having a content different from that of the first layer.

Claim 24 (New): The semiconductor device according to claim 23, wherein the surface of the semiconductor element is covered with the first layer.

Claim 25 (New): The semiconductor device according to claim 2, wherein the sealing member has an emission surface having a shape that is an approximately symmetrical parabola with respect to the light-emitting element when viewed along the vertical axis extending from the top surface toward the bottom of the recess.

Claim 26 (New): The semiconductor device set forth in claim 2, wherein the further recess is a cylindrical recess and the protrusion is a circular protrusion.

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Claim 27 (New): The semiconductor device set forth in claim 2, wherein said protrusion is a cylindrical protrusion.

Claim 28 (New): The semiconductor device set forth in claim 2, wherein the further recess is a cylindrical recess.

Claim 29 (New): The semiconductor device set forth in claim 2, wherein said protrusion is a protrusion extending between opposite surfaces of the support member.

Claim 30 (New): The semiconductor device set forth in claim 2, further comprising at least one of:

a fluorescent material containing Al and at least one element selected from Y, Lu, Sc, La, Gd, Tb, Eu, Ga, In, and Sm; and activated with at least one element selected from the rare earth elements, and

a fluorescent material containing N, at least one element selected from Be, Mg, Ca, Sr, Ba, and Zn; and at least one element selected from C, Si, Ge, Sn, Ti, Zr, and Hf; and activated with at least one element selected from the rare earth elements.

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Claim 31 (New): The semiconductor device set forth in claim 2, wherein said semiconductor element further comprises at least one of:

a fluorescent material containing Al and at least one element selected from Y, Lu, Sc, La, Gd, Tb, Eu, Ga, In, and Sm; and activated with at least one element selected from the rare earth elements, and

a fluorescent material containing N, at least one element selected from Be, Mg, Ca, Sr, Ba, and Zn; and at least one element selected from C, Si, Ge, Sn, Ti, Zr, and Hf; and activated with at least one element selected from the rare earth elements.

Claim 32 (New): The optical device set forth in claim 6, wherein the emission surface has a shape that is an approximately symmetrical parabola with respect to the light emitting element when viewed along the vertical axis extending from the emission surface toward the bottom of the recess.

Claim 33 (New): The optical device set forth in claim 6,

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wherein the emission surface is so configured that a gap is formed between the emission surface and the light entrance portion.

Claim 34 (New): The optical device set forth in claim 7, wherein said emission surface has a shape that is an approximately symmetrical parabola with respect to the light emitting element when viewed along the vertical axis extending from the top surface to the bottom of the recess.

Claim 35 (New): The optical device set forth in claim 7, wherein the emission surface is so configured that a gap is formed between the emission surface and the light entrance portion.

Claim 36 (New): The semiconductor device set forth in claim 14, wherein the further recess is a circular recess.

Claim 37 (New): The semiconductor device set forth in claim 14, wherein the protrusion is a circular protrusion.

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Claim 38 (New): A semiconductor device comprising:
a semiconductor element;
a support member having a recess for housing the
semiconductor element, the support member including lead
electrodes and a support part holding the lead electrodes so
that a surface of each of the lead electrodes is exposed in a
bottom of the recess;
wherein the support member has at least a first surface
disposed outside of the recess having a sealing member therein
and a second surface extending outwardly from the first surface,
and
wherein the second surface is angularly offset from the
first surface less than 90 degrees.